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ANNUAL SUMMARY REPORT NO. 1.

1 MARCH, 1960, THROUGH 28 FEBRUARY, 1961.

INVESTIGATION OF NATURAL ATMOSPHERIC AUDIO-FREQUENCY ELECTRO-MAGNETIC SIGNALS (WHISTLER AND CHORUS PHENOMENA) FROM OBSERVING STATIONS AT SALTHOLM, DENMARK, AND GODHAVN, GREENLAND.

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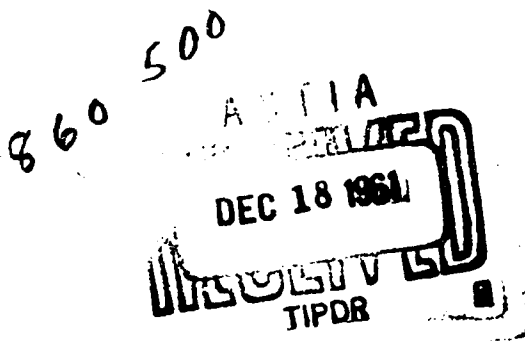
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Geophysics Research Directorate
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This Report is intended only for the internal management uses of the Contractor, the U.S. Air Force, and the Danish sponsors.

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Jørgen Rybner
Professor of Telecommunications
Royal Technical University
of Denmark



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a. INVESTIGATIONS BEING UNDERTAKEN

The purpose of the present research work is to conduct experimental investigations and studies of natural atmospheric audio-frequency electromagnetic signals (known as the whistler and chorus phenomena). The research includes:

1. Investigation of whistlers and related phenomena from observing stations at Saltholm, near Copenhagen, Denmark, and at Godhavn, Greenland.
2. Analysis and correlation of the observed data with respect to ionospheric and geomagnetic disturbances with the objective of contributing to knowledge of structure and behaviour of the ionosphere from beyond the height of the F-layer maximum to a distance of several earth radii.

The observations consist in recording for two minutes every hour the electromagnetic atmospherics of audio-frequencies by means of an equipment consisting of an aerial, an amplifier, and a tape recorder.

The equipment for Godhavn has been designed and built at the laboratories of the Royal Technical University of Denmark, and some of the equipment for Saltholm has been constructed by courtesy of Professor J. Oskar Nielsen, chief of the Teletechnic Research Laboratory, Copenhagen.

The work is being sponsored by the Geophysical Research Directorate, Air Force Cambridge Research Center, of the Air Research and Development Command, United States Air Force, through the European Office. This authority has granted means for the scientific assistance, travel expenses, and publications, whereas the Danish Science Foundation and the Danish Research Foundation for Technical Sciences have granted means for the purchase of the necessary equipment.

Saltholm

Routine recordings have been undertaken since May 16, 1960, during two minutes every hour. These were in the beginning placed at 35 to 37 minutes past the full hour but were shifted to 50 to 52 minutes past as from October 1, 1960. The quality of the re-

cordings is good. Routine scaling of the records was commenced November 1. Whistlers and ionospheric noise is found regularly. A preliminary study of the daily distribution of the phenomena has been undertaken and as far as the whistler distribution concerns it is for the period up to the end of July nearly as expected. The distribution of ionospheric noise shows the peak a couple of hours earlier than expected according to observations at other stations at the same geomagnetic latitude.

Comparison with data from Marion Island has not been possible yet as no data has arrived at the University of Natal. There has still been some difficulties with the power supply at the Marion Island station. Because of these difficulties we set up a schedule for supplementary recordings. This schedule consists of recordings each Monday and Thursday from 1600 to 1620 GMT and from 2200 to 2220 GMT, and was started at Saltholm Monday December 12, 1960.

Godhavn

The routine recordings at Godhavn have been continued. Routine scaling in Copenhagen was started in the fall of 1960.

Due to the improved equipment, flashes appearing ahead of short whistlers were detected on records from 1960. Several nose whistlers were also observed. In spite of the improved sensitivity of the equipment we still observe the high cut off frequency.

An equipment for recording of noise in a narrow band centered at 825 c/s was set up October 6, 1960, and was later supplied with band-pass filter with a center frequency of 8 kc/s. Recordings on the two frequencies will take place alternately.

b. DIFFICULTIES IN THE RESEARCH

None.

c. RESEARCH PLANS FOR THE NEXT YEAR

Saltholm and Godhavn

Routine recordings and regular scalings of the data with analysis of whistlers for determination of dispersion variations will be continued.

The new sensitive equipment has revealed a multitude of new features which must be further studied with the purpose of looking

for interrelations and for correlations with other geophysical phenomena.

d. PERSONNEL AND ADMINISTRATION

The daily leader of the scientific work is Mr. Eigil Ungstrup, M.Sc.. The recordings in Godhavn are being carried out by the leader of the Ionospheric Observatory, Mr. T. Stockflet Jørgensen, M.Sc..

Observations from Saltholm are being transmitted by telephone cable to The Teletechnical Research Institute, Borups Alle in Copenhagen, where recording takes place.

Administration is taken care of by Professor Jørgen Rybner. The secretary is Mrs. Aase Eldov.

The following staff have been working under this contract in the course of the year:

Eigil Ungstrup
Inger M. Jackerott, Miss
Christian Svane
Jørgen Taagholt
Finn Spangslev
Henry Rossle
Aase Eldov.

e. TRAVEL ON THE CONTRACT

No travel in the present period.